ABSTRACT OF THE DISCLOSURE

Methods and systems are disclosed herein in which a physical neural network can be configured utilizing nanotechnology. Such a physical neural network can comprise a plurality of molecular conductors (e.g., nanoconductors) which form neural connections between pre-synaptic and post-synaptic components of the physical neural network. Additionally, a learning mechanism can be applied for implementing Hebbian learning via the physical neural network. Such a learning mechanism can utilize a voltage gradient or voltage gradient dependencies to implement Hebbian and/or anti-Hebbian plasticity within the physical neural network. The learning mechanism can also utilize pre-synaptic and post-synaptic frequencies to provide Hebbian and/or anti-Hebbian learning within the physical neural network.